AFRICAN EASTERLY WAVE CLIMATOLOGY DOCUMENTATION: README

SUMMARY

The AEWC dataset was created using a new algorithm developed by researchers at Georgia Tech and represents the first attempt to produce a standard easterly wave tracking dataset for the East Pacific, Atlantic, and Africa. This dataset has been designed for atmospheric scientists to aid in the study of easterly wave genesis, intensification, and decay as well as the relationship between tropical cyclones and easterly waves. The algorithm uses curvature vorticity anomalies to identify the location of easterly waves as a function of time.

DATASET INFORMATION

The dataset provides 6-hourly coverage over a 63-year period (January 1948-December 2010) in the region bounded by 35^{o}S–35^{o}N x 140^{o}W–40^{o}E. Data files are derived using four separate atmospheric reanalysis products including: 1) the ERA-40 dataset (covers the period January 1958 to December 2001); 2) the ERA-Interim dataset (covers the period January 1979 to December 2010); the CFS-R dataset (covers the period January 1979 to December 2010); and the NCEP/NCAR I dataset (covers the period January 1948 to December 2010). Other data sources used in the production of the AEWC are the Remote Sensing Systems SSM/I Total Precipitable Water, Rain Rate, and Cloud Liquid Water content products, Claus Brightness Temperature, and Outgoing Longwave Radiation from the NCDC Daily OLR CDR.

Each netCDF file contains all the easterly waves that originate in a given year, the isobaric level for easterly wave tracking (600hPa, 700hPa, and 850hPa) and the zone from which the easterly wave began its development. Zones include: Africa (AFR), Central America (CAM), North Atlantic (NAL), Northeast Pacific (NEP), South Atlantic (SAL), South America (SAM), Southeast Pacific (SEP), and Other (OTH). See Figure 1 for the regional delineations.

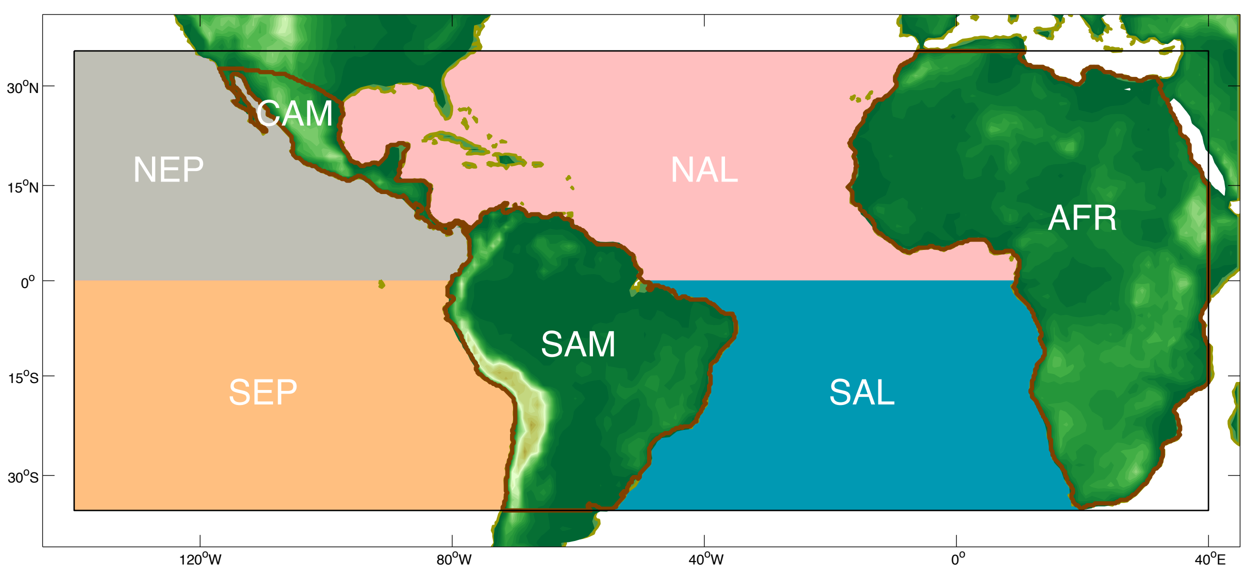

Figure 1: Map of the seven easterly wave generation regions: Northeast Pacific (NEP), Southeast Pacific (SEP), Central America (CAM), South America (SAM), North Atlantic (NAL), South Atlantic (SAL), Africa (AFR), along with Other (OTH), which is all other locations within the domain: 35oS–35oN, 140oW–40oE that is not contained within the seven defined regions.

NetCDF files are named according to the following pattern:
<ReanalysisSourceType>_ew_<IsobaricLevel>_<year>_<OriginatingSource>.nc, where <ReanalysisSourceType> is: CFS, ERA-40, ERA-Int, or NCEP, <IsobaricLevel> is 600hPa, 700hPa, or 850hPa, <year> is 1948–2010, where available, and < OriginatingSource> is NEP, SEP, CAM, SAM, NAL, SAL, AFR, or OTH.

NETCDF FILE CONTENTS
Each file contains 39 variables for each easterly wave (EW) which are summarized in the following table along with a description of the variable and method that was used for its derivation.

Variable Names	Description
wave observation count	number of 6-hr observations for each EW
wave trajectory id	unique EW identifier
wave time	time stamp for EW (units: days since 1900-01-01 00:00:00)
wave trough centroid latitude	calculated by averaging the latitudes for all EW trough gridpoints
wave trough centroid longitude	calculated by averaging the longitudes for all EW trough gridpoints
wave trough maximum latitude	calculated by finding the maximum latitude for all EW trough gridpoints
mean longitude of wave trough maximum latitude	calculated by averaging the longitudes of all EW trough maximum latitude gridpoints
wave trough minimum latitude	calculated by finding the minimum latitude for all EW trough gridpoints
mean longitude of wave trough minimum latitude	calculated by averaging the longitudes of all EW trough minimum latitude gridpoints
wavelength	horizontal wavelength of the EW (in km) calculated by using a factor four scaling of the horizontal extent of the wave trough region in the direction of the EW's forward motion
wave trough mean relative vorticity	calculated by averaging the relative vorticity of all EW trough gridpoints
wave trough maximum relative vorticity	calculated by finding the maximum relative vorticity of all EW trough gridpoints
wave trough minimum relative vorticity	calculated by finding the minimum relative vorticity of all EW trough gridpoints
wave trough standard deviation relative vorticity	calculated by finding the standard deviation of relative vorticity of all EW trough gridpoints
wave trough mean curvature vorticity	calculated by averaging the curvature vorticity of all EW trough gridpoints
wave trough maximum curvature vorticity	calculated by finding the maximum curvature vorticity of all EW trough gridpoints
wave trough minimum curvature vorticity	calculated by finding the minimum curvature vorticity of all EW trough gridpoints

wave trough standard deviation curvature vorticity	calculated by finding the standard deviation of curvature vorticity of all EW trough gridpoints
wave trough mean shear vorticity	calculated by averaging the shear vorticity of all EW trough gridpoints
wave trough maximum shear vorticity	calculated by finding the maximum shear vorticity of all EW trough gridpoints
wave trough minimum shear vorticity	calculated by finding the minimum shear vorticity of all EW trough gridpoints
wave trough standard deviation shear vorticity	calculated by finding the standard deviation of shear vorticity of all EW trough gridpoints
wave trough mean Claus brightness temperature	calculated by averaging the Claus brightness temperature, where available, of all EW trough gridpoints
wave trough standard deviation Claus brightness temperature	calculated by finding the standard deviation of Claus brightness temperature, where available, of all EW trough gridpoints
wave trough Claus brightness temperature area fraction	calculated as the proportion of all EW trough gridpoints where valid Claus brightness temperature is available relative to the total number of EW trough gridpoints
wave trough mean total precipitable water	calculated by averaging the SSM/I total precipitable water, where available, of all EW trough gridpoints
wave trough standard deviation total precipitable water	calculated by finding the standard deviation of SSM/I total precipitable water, where available, of all EW trough gridpoints
wave trough total precipitable water area fraction	calculated as the proportion of all EW trough gridpoints where valid SSM/I total precipitable water is available relative to the total number of EW trough gridpoints
wave trough mean rain rate	calculated by averaging the SSM/I rain rate, where available, of all EW trough gridpoints
wave trough standard deviation rain rate	calculated by finding the standard deviation of SSM/I rain rate, where available, of all EW trough gridpoints
wave trough rain rate area fraction	calculated as the proportion of all EW trough gridpoints where valid SSM/I rain rate is available relative to the total number of EW trough gridpoints
wave trough mean cloud liquid water	calculated by averaging the SSM/I cloud liquid water, where available, of all EW trough gridpoints
wave trough standard deviation cloud liquid water	calculated by finding the standard deviation of SSM/I cloud liquid water, where available, of all EW trough gridpoints
wave trough cloud liquid water area fraction	calculated as the proportion of all EW trough gridpoints where valid SSM/I cloud liquid water is available relative to the total number of EW trough gridpoints
wave trough mean outgoing longwave	calculated by averaging outgoing longwave radiation from the NCDC Daily OLR CDR, where available, of all EW trough

radiation	gridpoints
wave trough standard deviation outgoing longwave radiation	calculated by finding the standard deviation of outgoing longwave radiation from the NCDC Daily OLR CDR, where available, of all EW trough gridpoints
wave trough outgoing longwave radiation area fraction	calculated as the proportion of all EW trough gridpoints where valid outgoing longwave radiation from the NCDC Daily OLR CDR is available relative to the total number of EW trough gridpoints
wave trough mean outgoing longwave radiation anomaly	calculated by averaging outgoing longwave radiation anomalies from the NCDC Daily OLR CDR, where available, of all EW trough gridpoints. OLR anomalies are derived using a daily 30-year OLR climatology for the period 1981–2010.
wave trough standard deviation outgoing longwave radiation anomaly	calculated by finding the standard deviation of outgoing longwave radiation anomalies from the NCDC Daily OLR CDR, where available, of all EW trough gridpoints. OLR anomalies are derived using a daily 30-year OLR climatology for the period 1981–2010.

Easterly wave trajectories are stored in the netCDF-4 format following the CF v1.6 conventions using level 2 compression. To reduce further the file size, easterly waves are stored in a continuous, ragged array representation in which the wave count variable is used to indicate the number of elements of each easterly wave feature.